

**Oroville Relicensing Efforts  
Environmental Work Group  
Draft Resource Actions Development Management Table**

EWG_ID	Resource Action (PM&E) Description	Immediate Actions to be Taken	Objectives	PM&E Sponsor [From May EWG Meeting]	Resource Action Team Leader	Resource Action Advisory Team (with PDEA Team)	Comments
EWG-4B	Provide high flow pulses in winter-spring (Feb-May) that will serve as attraction flows primarily for shad (May-June), sturgeon (February-June), and splittail (January-April). Secondly, pulse flows would serve as attraction flows for spring-run Chinook salmon and steelhead. (High Flow Channel)	Additional information needed regarding the magnitude of the flow pulse desired (i.e. 2X base flow) and the frequency and duration with which the pulse desired (i.e. one week per month, one day per week, etc.). Need some type of supporting data on this (i.e. Fishing guides don't fish for sturgeon above particular flows, etc.)	Provide attraction flows for shad, sturgeon, and splittail to facilitate upstream migration. [Pulse flows will also serve as attraction flows for spring-run Chinook salmon and steelhead.]	Chuck Hanson	David Olson	Dave Olson, Chuck Hanson, & Paul Bratovich	Flow could originate from the Thermalito Afterbay Outlet or the Thermalito Diversion Dam. Releases for attraction flows would require coordination with Yuba River operations. Potential cross-resource effect on riparian vegetation and fluvial processes, depending on the magnitude of flow alterations. Redds constructed in shallow water during pulse flows may result in dewatering or juvenile fish stranding (Chinook salmon and steelhead).
EWG-15	Incrementally increase flows in the low-flow reach of the Feather River during the Chinook salmon and steelhead spawning seasons to increase habitat quantity by providing opportunity for expanded lateral spawning distribution. Reduce redd superimposition and provide additional usable spawning habitat. (Low Flow Channel)	Needs additional information regarding the target flow range in which this action would occur and the duration of the flow increases.	Improve and increase spawning habitat for Chinook salmon	Chuck Hanson	Dave Olson & Ted Sommer	David Olson & Tom Payne	This Resource Action is flow related. SP-F16 may be able to provide an assessment of the benefit associated with this PM&E by evaluating lateral redd distribution in response to flow changes. Also see IFIM study.
EWG-16A	Create side-channel habitat adjacent to the low-flow reach in the Feather River. DWR studies have found that juvenile steelhead trout strongly select shallow riffle/glide and near-shore habitats with abundant riparian and in-stream cover. Habitats meeting these criteria are most often found in side channels. Currently preferred habitats of juvenile steelhead are not common in the LFC. To expand availability of preferred rearing habitat, side channels should be constructed at various suitable areas within the LFC. (Low Flow Channel)	Needs further analysis on how side-channel habitat will be created. Detailed site evaluations will be necessary to determine which site are most amenable to side channel creation or enhancement.	Create rearing habitat for juvenile salmonid fish species	Rich Dehaven	Phil Unger & Jason Kindopp	Tom Payne, Brad Cavallo, Jason Kindopp, & Dave Olson	Potential sites for side channel creation in the LFC include (from upstream to downstream): Aleck Riffle, Great Western Riffle, Robinson Riffle/Borrow Pond, Steep Riffle, between Eye and Gateway Riffles, and the OWA southeast of the Thermalito Outlet. Side channel creation will be most effective if conducted in combination with base flow increase, planting of riparian vegetation, and re-establishment of flow through historic river channels. Ongoing studies associated with SP-G2 will provide additional data.
EWG-16B	Restore and/or improve side-channel habitat adjacent to the low-flow reach in the Feather River. The two existing side channels at the upstream end of the LFC, Hatchery Ditch and Moe's Ditch, would benefit from habitat and flow enhancements. Hatchery Ditch, a primary steelhead spawning and rearing reach, is currently fed solely by seepage from the Feather River Hatchery (FRH) settling pond. Discharge in Hatchery Ditch is directly related to water use in the hatchery. Hatchery Ditch requires its own water source so that it can function independently. This need is particularly pressing since the FRH water system is overdue for a major overhaul, which requires shutting down the hatchery water supply for several months. Moe's Ditch is a man-made spawning channel adjacent to Hatchery Ditch. Currently Moe's Ditch suffers from a lack of flow (due to upstream changes in bed morphology) and a lack of cover and channel sinuosity. (Low Flow Channel)		Improve rearing habitat for juvenile salmonid fish species	Mike Melanson	Phil Unger & Jason Kindopp	Tom Payne, Brad Cavallo, Jason Kindopp, & Dave Olson	Improving habitat would include 'garden projects'.
EWG-21	Increase quantity of shallow water rearing habitat for juvenile salmonids in the high flow section of Feather River by releasing higher flows. (High Flow Channel)	Develop stage discharge curves (from SP-G2 info)	Improve rearing habitat for juvenile salmonid fish species	Mike Meinz	Ben Ransom with Dave Olson	David Olson & Tom Payne	Increasing flows may or may not provide additional shallow water habitat depending upon the shape of the channel. Increased flows may result in loss of suitable habitat with respect to velocities. SP-F16 may provide information describing the relationship between flow and availability of Chinook and steelhead juvenile rearing habitat.
EWG-51	Enhance riparian vegetation and trees along banks for shading and increased habitat complexity. (Low Flow Channel)	Compare Feather River Characteristics with Susquehanna River.	Enhance riparian vegetation for increased shading and habitat complexity.	Sharon Stohrer	Richard Harris	Richard Harris, Koll Buer, & Gail Kuenster	One location for vegetation enhancement could be "trailer park riffle" along east side, although high-water events may require continued maintenance and/or improvement.
EWG-54	Modify recreational use patterns in Thermalito Complex to minimize impacts to important terrestrial species (exact measures dependent on analysis in upcoming report). Changes might include: closures, modification of boat speeds, angling access, or ORV restrictions. (Thermalito Complex)	Need to identify important species based on preliminary results of SP-T2 & SP-T9.	TBD (i.e. prevent damage to vernal pool species)	Woody Elliott	Dave Bogener with John Cannon	Dave Bogener, Gail Kuenster, MaryLou Keefe & John Cannon	Need update on status of Study Plans (Gail).
		Need to specifically identify how recreation is effecting species (i.e. 4x4 vehicles, boating and pedestrian traffic, etc.)				Dave Bogener, Gail Kuenster, MaryLou Keefe & John Cannon	Exact measures of Resource Action are dependent on analysis in upcoming study plan report. Need to identify which species would be impacted (vernal pool species, VELB, plus additional species of concern). A map defining the area would be helpful to better flush out suggested changes. Need to determine which agency would be responsible for the various reaches (DWR, F&G, and National Parks).
EWG-59	Modify recreational use patterns in Feather River and OWA reach to minimize impacts to important terrestrial species. (Oroville Wildlife Area)	Need to complete species survey.	Minimize terrestrial impacts from recreational use.	Andrew Atkinson	Dave Bogener with John Cannon	Dave Bogener, Gail Kuenster, MaryLou Keefe & John Cannon	Need update on status of Study Plans (Gail). Exact measures dependent on results of study plan report. Species of concern would include VELB. F&G have jurisdiction.
EWG-73	Control non-native and undesirable plant species (e.g., purple loose-strife) in the Thermalito Complex.	Need to review SP-T7 to see if the study plan will answer chemical and/or mechanical treatment options.	Eliminate noxious weeds in the Thermalito Complex (e.g. purple loose-strife).	Woody Elliott	Gail Kuenster with John Cannon	Gail Kuenster, Dave Stevens & John Cannon	Further information in needed on the life history traits and distribution of non-native and undesirable plant species in the area. Need update on status of Study Plans (Gail).

**Oroville Relicensing Efforts  
Environmental Work Group  
Draft Resource Actions Development Management Table**

EWG-74	Eliminate noxious plants via biological control, herbicidal treatment or mechanical control and replant with native species. (Oroville Wildlife Area)		Eliminate noxious weeds in the Oroville Wildlife Area	Andrew Atkinson	Gail Kuenster with John Cannon	Gail Kuenster, Dave Stevens & John Cannon	Need update on status of Study Plans (Gail). May require continued maintenance due to periodic high-flow events or evaluation of appropriate technique.
EWG-19B	Increase the operational flexibility to allow for decreases in water temperatures downstream of the Thermalito Afterbay Outlet to encourage gravel utilization downstream of Thermalito Afterbay Outlet. (High Flow Channel)	Need to determine how much cooler water would be needed from Lake Oroville to affect the Thermalito Afterbay Outlet.	Improve spawning habitat for Chinook salmon and steelhead	Mike Mainz	David Olson	David Olson & Modeling Group (Carl Chen & Eric Branstetter)	Modeling efforts will help determine how much cooler water would be needed from Lake Oroville to affect water temperatures in the Thermalito Afterbay Outlet. [This is for spawning habitat enhancement.]
EWG-35	Lower existing water temperatures at the Thermalito Afterbay Outlet for the purpose of reducing feeding rates for predators in the Feather River. (High Flow Channel)	Data needed on impact of cooler flows to Feather River biotic resources. (Cooler water may result in slower growth for salmonids.)	Reduce predation by centrachids (large & small mouth bass, and striped bass). Probably would not impact/affect Hardhead or Sacramento Pikeminnow.	Chuck Hanson	David Olson	David Olson & Modeling Group	Unclear to what extent colder releases from the Thermalito Afterbay could lower Feather River water temperatures. Extent of effect of predation on juvenile salmonids is unquantified. The use of water temperature as a mechanism to exclude predators from the LFC could also be discussed. Need to find out what time of year would this take place and by how much would water temperatures be lowered.
EWG-83	Operate the Thermalito Complex to provide colder water to Lower Feather River for the benefit of salmonids. (High Flow Channel)	Need results of water temperature modeling study.	Enhance fish habitat by improving water temperatures for salmonids.	Sharon Stohrer	David Olson	David Olson & Modeling Group (Carl Chen & Eric Branstetter)	This Resource Action would improve habitat for rearing juvenile and pre-spawning adults. [This is for fish habitat enhancement.]
EWG-89	Create levee setbacks to increase meandering nature of river and improve gravel composition in critical spawning reaches of the low-flow reach. This could be implemented in the low-flow channel, high-flow channel, and OWA. (Low Flow Channel)	Identify which control levees would be used (D. Olson).	Increase meandering nature of river and improve gravel composition in critical spawning reaches of the low-flow reach. Also, increase inundatable floodplain habitat to provide additional fish habitat.	Steve Rothert	Phil Unger	David Olson & Modeling Group (Carl Chen & Eric Branstetter)	Ongoing field analysis associated with SP-G2 will provide additional data. Koll Buer to assist with the narrative reports.
EWG-97	Provide upstream passage of anadromous fish (e.g., spring-run Chinook) through trap and transport program. [Passage would be to locations upstream of Oroville Dam including the upstream tributaries.] (Lake Oroville)	Compare Feather River Characteristics with Susquehanna (PA) River.	Improve upstream passage for adult spring-run Chinook salmon. (This may include habitat enhancement.)	Eric Theiss	David Olson	Dave Olson, Phil Unger, Eric See, & MaryLou Keefe	This Resource Action is a place holder for the potential re-introduction of spring-run Chinook to the upstream tributaries of Lake Oroville. An upstream fish passage PM&E description is forthcoming from NOAA Fisheries. SP-F15 will provide an analysis of the feasibility of providing passage for anadromous fish upstream of Lake Oroville using a wide variety of fish passage mechanisms/programs. There is also a concern related to potential fish disease, predation, genetic introgression, and potential competition for food and habitat with resident fish.